

Ex. 1

Given the alphabet  $X = \{a, b, c\}$ , propose a deterministic finite-state automaton (not necessarily complete) which recognizes all the words of  $X^*$  which contain at least two different letters.

Ex. 2

Consider the following regular grammar:

$$\begin{aligned} S &\rightarrow aA \mid bB \\ B &\rightarrow aA \mid bC \mid b \\ A &\rightarrow bB \mid aC \mid a \\ C &\rightarrow aC \mid a \mid b \mid bC \end{aligned}$$

1. Build the finite-state automaton corresponding to this grammar (hint: the states of the automaton correspond closely to the non-terminal symbols of the grammar).
2. Show the sequences of states corresponding to the recognition path of the words *aaa*, *babba* and *babaaaa*.
3. Is this automaton deterministic? If not, propose a deterministic finite-state automaton recognizing the same language.